ALASKA POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT FACT SHEET – Preliminary Draft

Permit Number: AKG375000

Small Suction Dredge Placer Miners General Permit

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Wastewater Discharge Authorization Program
555 Cordova Street
Anchorage, AK 99501

Public Comment Period Start Date: **Pending**
Public Comment Period Expiration Date: **Pending**
Alaska Online Public Notice System: https://aws.state.ak.us/OnlinePublicNotices/

Technical Contact: Nick Dallman
Alaska Department of Environmental Conservation
Division of Water / Wastewater Discharge Authorization Program
610 University Avenue
Fairbanks, Alaska 99709
Phone: (907) 451-2142 / Fax: (907) 451- 2187
nicholas.dallman@alaska.gov

Proposed issuance of an Alaska Pollutant Discharge Elimination System (APDES) general permit for:

SMALL SUCTION DREDGE PLACER MINERS

The Alaska Department of Environmental Conservation (hereinafter referred to as the Department or DEC) proposes to reissue an APDES general permit (hereinafter referred to as permit or GP) for small suction dredge placer miners. The permit authorizes and sets conditions on the discharge of pollutants from small suction dredges and highbankers to waters of the United States located in the State of Alaska. To ensure protection of water quality and human health, the permit limits the types of pollutants that can be discharged, establishes seasonal and geographic restrictions, and outlines best management practices that must be adhered to.

This fact sheet explains the nature of potential discharges from small suction dredges and highbankers and the development of the permit including:

- information on appeal procedures;
- a description of the industry;
- a listing of permit conditions; and
- technical material supporting the conditions in the permit.

Public Comment

Persons wishing to comment on, or request a public hearing for the draft permit for this facility, may do so in writing by the expiration date of the public comment period.

Commenters are requested to submit a concise statement on the permit condition(s) and the relevant facts upon which the comments are based. Commenters are encouraged to cite specific permit requirements or conditions in their submittals.

A request for a public hearing must state the nature of the issues to be raised, as well as the requester's name, address, and telephone number. The Department will hold a public hearing whenever the Department finds, on the basis of requests, a significant degree of public interest in a draft permit. The Department may also hold a public hearing if a hearing might clarify one or more issues involved in a permit decision or for other good reason, in the Department's discretion. A public hearing will be held at the closest practicable location to the site of the operations. If the Department holds a public hearing, the Director will appoint a designee to preside at the hearing. The public may also submit written testimony in lieu of or in addition to providing oral testimony at the hearing. A hearing will be tape recorded. If there is sufficient public interest in a hearing, the comment period will be extended to allow time to public notice the hearing. Details about the time and location of the hearing will be provided in a separate notice.

All comments and requests for public hearings must be in writing and should be submitted to the Department at the technical contact address, fax, or email identified above (see also the public comments section of the attached public notice). Mailed comments and requests must be postmarked on or before the expiration date of the public comment period.

After the close of the public comment period and after a public hearing, if applicable, the Department will review the comments received on the draft permit. The Department will respond to the comments received in a Response to Comments document that will be made available to the public. If no substantive comments are received, the tentative conditions in the draft permit will become the proposed final permit.

The proposed final permit will be made publicly available for a five-day applicant review. After the close of the proposed final permit review period, the Department will make a final decision regarding permit issuance. A final permit will become effective 30 days after the Department's decision, in accordance with the state's appeals process at 18 AAC 15.185.

The Department will transmit the final permit, fact sheet (amended as appropriate), and the Response to Comments to anyone who provided comments during the public comment period or who requested to be notified of the Department's final decision.

The Department has both an informal review process and a formal administrative appeal process for final APDES permit decisions. An informal review request must be delivered within 15 days after receiving the Department's decision to the Director of the Division of Water at the following address:

Director, Division of Water
Alaska Department of Environmental Conservation
555 Cordova Street
Anchorage, AK 99501

Interested persons can review 18 AAC 15.185 for the procedures and substantive requirements regarding a request for an informal Department review.

See http://www.dec.state.ak.us/commish/InformalReviews.htm for information regarding informal reviews of Department decisions.

An adjudicatory hearing request must be delivered to the Commissioner of the Department within 30 days of the permit decision or a decision issued under the informal review process. An adjudicatory hearing will be conducted by an administrative law judge in the Office of Administrative Hearings within the Department of Administration. A written request for an adjudicatory hearing shall be delivered to the Commissioner at the following address:

Commissioner
Alaska Department of Environmental Conservation
410 Willoughby Avenue, Suite 303
Juneau AK, 99811-1800

Interested persons can review 18 AAC 15.200 for the procedures and substantive requirements regarding a request for an adjudicatory hearing. See http://www.dec.state.ak.us/commish/ReviewGuidance.htm for information regarding appeals of Department decisions.

Documents are Available

The permit, fact sheet, and related documents can be obtained by visiting or contacting DEC between 8:00 a.m. and 4:30 p.m. Monday through Friday at the addresses below. The permit, fact sheet, and other information are located on the Department's Wastewater Discharge Authorization Program website: http://www.dec.state.ak.us/water/wwdp/index.htm.

Alaska Department of Environmental Conservation Division of Water Wastewater Discharge Authorization Program 555 Cordova Street Anchorage, AK 99501 (907) 269-6285	Alaska Department of Environmental Conservation Division of Water Wastewater Discharge Authorization Program 610 University Avenue Fairbanks, AK 99709 (907) 451-2136
Alaska Department of Environmental Conservation Division of Water Wastewater Discharge Authorization Program 410 Willoughby Avenue, Suite 303 Juneau AK, 99811 (907) 465-5300	

TABLE OF CONTENTS

List of Tables

1.0 PERMIT COVERAGE

1.1 Coverage and Eligibility

Section 301(a) of the Clean Water Act (CWA) and DEC regulations at 18 AAC 83.015 provide that the discharge of pollutants is unlawful except in accordance with an APDES permit. Although such permits are usually issued to individual dischargers, DEC regulations [18 AAC 83.205(b)(2)(A-E)] also authorize the issuance of general permits to categories of discharges within a geographic area when a number of point sources all:

- Involve the same or substantially similar types of operations;
- Discharge the same types of wastes;
- Require the same effluent limitations or operating conditions;
- Require the same or similar monitoring requirements; and
- In the opinion of the Department, are more appropriately controlled under a general permit than under individual permits.

Permit Part 1.1 summarizes coverage and eligibility requirements for discharging facilities under the general permit. The permit provides statewide coverage for discharges to fresh and marine waters of the U.S. within Alaska, with certain restrictions. Eligible facilities are authorized to discharge upon completion of annual registration requirements (Fact Sheet Section 1.5). Discharge authorizations expire after December 31 of the year that the authorization was issued and must be renewed prior to the start of operation of each year.

1.2 Authorized Placer Mining Operations

Permit Part 1.2 outlines operations that are authorized under the permit.

The original 1994 *Permit for Placer Mining in Alaska* (Fact Sheet Section 2.0), issued by the U.S. Environmental Protection Agency (EPA), covered suction dredges with intake nozzle diameters less than or equal to four inches. The 2002 EPA-reissuance of the *Alaskan Small Suction Dredge Placer Miners General Permit* (AKG375000) increased the maximum allowed intake diameter to six inches. The 2007 permit established a maximum horsepower (hp) limit of 18 to align the permit with requirements of the Alaska Department of Fish & Game (ADF&G) and Alaska Department of Natural Resources (DNR). The 2012 DEC-issued permit expanded the horsepower limit to 23 for marine operations; removed restrictions that limited hose diameter to “2 inches larger than the nozzle size”; included coverage for highbankers (also known as power sluices); and included special coverage and discharge requirements for dredges greater than 18 hp in fresh waters or 23 hp in marine waters. Modifications are detailed within prior fact sheets.

The 2017 permit retains the intake diameter limit of six inches and horsepower limits of 18 (fresh water) and 23 (marine water). Additionally, the permit reintroduces restrictor ring specifications from earlier permits that were excluded from the 2012 issuance. The restrictor ring specifications align the permit with requirements of the *Medium Suction Dredge Placer*

Miners General Permit (AKG371000) and ensure processing rates effectively remain within the six inch diameter limit.

The 2012 permit introduced coverage and limitations for large horsepower dredges (greater than 18 hp in fresh waters or 23 in marine waters) to accommodate dredges that were previously excluded from coverage under APDES suction dredge general permits. The new limitations for large horsepower dredges aligned with requirements of AKG371000. As of the 2017 reissuance of the *Small Suction Dredge Placer Miners General Permit*, only one large horsepower dredge remained active under this category, possibly because most small dredges opt to remain within the lower horsepower requirements of other State agencies. Operations choosing to increase horsepower also generally increase intake diameters resulting in coverage under AKG371000. Due to low demand, the coverage category for large horsepower dredges has been removed from the 2017 permit. Small dredges with large horsepower are eligible coverage under the *Medium Suction Dredge Placer Miners General Permit* as of the 2015 reissuance.

Although the 2017 permit includes coverage for highbankers, the title *Small Suction Dredge Placer Miners General Permit* will be retained until additional tracking information is obtained on the volumes of highbankers operating under the permit. Furthermore, because discharges from highbankers are similar to small suction dredges and are suspected to only comprise a small percentage of permitted facilities under the permit, Fact Sheet explanations hereafter will only explicitly reference small suction dredges unless otherwise noted.

1.3 Limitations on Coverage

Permit Part 1.3 details operations that are not authorized under the permit. Operations that are not authorized must gain coverage under another applicable general permit or apply for and obtain an individual permit. Operations are limited or restricted under this permit because the discharges may occur in management areas or sensitive areas that are excluded from coverage based on past input from the public and other regulatory agencies, or potentially contain pollutants that require monitoring beyond the scope of the permit.

Language and conditions applicable to operations in federal reserves (Permit Part 1.5) and Endangered Species Act (ESA) critical habitat (Permit Part 1.3) have been modified within the 2017 permit to align with conditions of the more recently issued 2015 *Medium Suction Dredge Placer Miners General Permit*. The modifications are intended to establish consistency with buffers for other protected and sensitive resources, simplify authorizations for operators, and incorporate flexibility into the authorization process.

The 2017 permit adds language clarifying that discharges to locations not described within the annual discharge registration are not authorized. The language includes an exception wherein operations with NOIs listing locations within the Norton Sound offshore dredge area are authorized coverage for the entire offshore dredge area. Operations offshore of Nome work within a public recreation area or on nearby offshore leases or submerged claims; however, the operations frequently change locations based on contracts with mineral property owners. The fixed coverage area, as defined in Permit Appendix C, allows operators to move among the various mineral properties and allows for a streamlined registration process.

The 2012 permit included notification requirements and special conditions for discharges within polar bear critical habit. Subsequent to the permit issuance, the U.S. District Court for the District of Alaska, on January 10, 2013, issued an order vacating and remanding to the U.S. Fish

Wildlife Service a December 7, 2010 Final Rule designating critical habitat for polar bear. Therefore, at this time, there is no critical habitat designated for polar bear and related conditions have been removed from the permit.

1.4 Operations Requiring Individual Permits

As outlined in APDES regulations, "the department may terminate or revoke any discharger's coverage under a general permit, and may require the discharger to apply for and obtain an individual APDES permit" or "an interested person may petition the department to take action" under certain situations (18 AAC 83.215). For example, an individual permit may be required when 1) the permittee is not in compliance with the conditions of the general permit; 2) a change has occurred in the availability of demonstrated technology or practices for the control of pollutants applicable to the facility; 3) effluent limitations guidelines are promulgated for facilities covered by the general permit; or 4) circumstances have changed so that the permittee is no longer appropriately controlled under the general permit. The permit cites the regulation by reference under Permit Part 1.4.

1.5 Notification Requirements

Owners or operators of eligible facilities are automatically covered under the permit without submittal of a Notice of Intent (NOI) but must complete annual registrations prior to the start of operation each year. Any additional notification requirements for federal reserves or ESA critical habitat must be satisfied during the registration process. Permittees must also contact ADF&G and obtain any necessary Fish Habitat Permits prior to the start of discharge.

APDES regulations allow the Department to provide coverage to a discharger under a general permit without submitting an NOI, if the reasons for not requiring an NOI are stated in the public notice of the general permit [18 AAC 83.210 (g)].

In making the finding that a NOI is not required, the Department considered the following [18 AAC 83.210 (g)(1) – (6)]:

- **The type of discharge**

  The permit provides coverage for highbankers and suction dredges with intake diameters less than or equal to six inches and pump engines less than or equal to 18 hp in fresh water and 23 hp in marine water. Facilities that propose to discharge in federal reserves or certain ESA habit areas are subject to additional review by the agency with management authority over the area.

- **The expected nature of the discharge**

  Suction dredges are designed to work as a unit to dig, classify, beneficiate ores and dispose of waste. Highbankers operate in similar manner, however, are hand-fed with a shovel or bucket, rather than a suction hose. Because suction dredges and highbankers authorized under this permit work the stream bed or ocean floor, rather than terrestrial areas, the discharges consist entirely of in-situ water and bed material (see Fact Sheet Section 3.0, Industry Description).

- **The potential for toxic and conventional pollutants in the discharge**

Because the discharge from suction dredges consists totally entirely of in-situ water and bed material, the potential for toxic and conventional pollutants in the discharge is limited to those materials already found in the receiving water and stream or ocean bed. Turbidity, the primary pollutant of concern is mitigated through implementation of best management practices (Fact Sheet Section 6.1).

- **The expected volume of the discharge**

  Small suction dredges are generally considered non-commercial, recreational equipment. Most small suction dredge activity occurs for a period ranging from two to eight hours a day, for a few days a week on average, and may be limited to seasonal work periods authorized by regulatory agencies. Dredge activity is further limited by environmental factors such as seasonal temperatures, water clarity, and water levels. Due to equipment size, the recreational nature of the activity, and limiting environmental conditions, small suction dredges move and discharge a relatively small amount of material.

- **Other means of identifying a discharge covered by the permit**

  The permit requires that covered facilities complete annual online registrations prior to discharge each year. Annual registration includes the name and contact information of the permittee, a description of the equipment used, and a list of locations where discharge is anticipated. The annual registration requirement ensures DEC has a method for identifying the number and locations of active operations under the permit.

- **The estimated number of discharges to be covered by the permit**

  DEC anticipates approximately 250 facilities, to be active on an annual basis (See Fact Sheet Section 2.0 – final paragraph). Numbers of active dischargers, however, are likely to fluctuate with changing gold prices and general public interest in the activity.

1.6 Permit Expiration

The permit will expire five years after the effective date.

Under 18 AAC 83.210(a), a general permit may be administered according to the individual permit regulations found in 18 AAC 83.115 and 18 AAC 83.120. Therefore, if the permit is not reissued prior to its expiration date, the permit will continue in force and effect until a new permit is issued.

2.0 REGULATORY HISTORY OF PLACER MINING IN ALASKA

On June 30, 1992, EPA received a notice of citizen suit alleging that EPA failed to perform a non-discretionary duty to regulate suction dredge gold placer mining operations in Alaska. At that time, EPA decided it would issue individual permits for mechanical placer mining operations (for the 1993 mining season) and propose a general permit for suction dredge operations. On January 14, 1994, EPA proposed a general permit that extended coverage to mechanical, as well as suction dredge operations (59 FR 2504). After responding to public comment, EPA issued the final *General Permit for Placer Mining in Alaska (AKG370000)* on May 13, 1994 (59 FR 28079). On September 28, 1994, two environmental groups filed a petition for review of the general permit in the Ninth Circuit Court of Appeals.

On November 18, 1996, EPA and the two environmental groups entered into a settlement agreement to resolve the challenge to the general permit. Pursuant to the agreement, EPA agreed to issue three separate general permits to modify and supersede the original general permit challenged by the environmental groups in 1994. The settlement agreement also required EPA to complete two studies related to the impact of placer mining on the natural environment in Alaska. One study was to address the discharge of metals by placer mining operations and the other was to address the impact of suction dredge mining.

EPA issued three modified general permits on December 6, 1996: one for mechanical operations, one for medium suction dredge operations, and one for small suction dredges (61 FR 64796). On April 4, 1997, three environmental groups challenged these permits. No. 97-70365 (9th Cir). In a separate action, the Alaska Miners Association (AMA) also challenged the general permits. No. 97-70379 (9th Cir.). These cases were consolidated on May 5, 1997. The challenge by the AMA was dismissed on January 21, 1999.

During the summers of 1997 and 1998, EPA staff and EPA contractors collected data at 31 placer mine sites and several suction dredge sites. The collected data was analyzed and presented in the following three reports: *Alaska Placer Mining Metals Study* (EPA 1998), *Alaska Placer Mining Metals Study - Year Two* (EPA 1999a), and *Impact of Suction Dredging on Water Quality, Benthic Habitat, and Biota in the Fortymile River, Resurrection Creek, and Chatanika River, Alaska* (Prussian et al. 1999). The environmental groups alleged that the suction dredge reports did not address all of the required elements as set out in the 1996 settlement agreement.

To avoid further litigation over the general permits, EPA and the environmental groups entered into another settlement agreement. Pursuant to the agreement, EPA agreed that further study was necessary to quantify the full impact of suction dredge mining on the natural environment, and that further research should be conducted before conclusions are reached about the impact of suction dredge mining on Alaska streams. EPA further agreed that by January 7, 2000, it would transmit to the Federal Register any necessary revisions to the modified general permits to address the results of the placer mining metals study (EPA 1998, 1999a). As a result, the environmental groups' petition to review the three general permits was dismissed on August 31, 1999.

EPA reissued the *Small Suction Dredge Placer Miners General Permit* in 2002 and 2007 without any significant changes (Table 1). On October 31, 2008, EPA approved the State's application to administer the National Pollutant Discharge Elimination System (NPDES) program. According to a memorandum of agreement between EPA and DEC (DEC 2008), authority to administer the State's Program, called the APDES Program, transferred in phases over four years. Under this phased approach, mining permits transferred on October 31, 2010. The transfer of mining permits included the 2007 EPA-issued *Small Suction Dredge Placer Miners General Permit* and all authorizations under the permit.

As of January 1, 2012, there were approximately 4,000 authorizations under the 2007 permit. However, because a single discharger had an average of four separate authorizations, each for a different location, the estimated number of authorized dischargers was 1,000. Furthermore, a single facility may only remain active for a only a short period under the multi-year general permit, resulting in large numbers of inactive permitted facilities over the life of the permit. Because ADF&G Fish Habitat Permits for small suction dredges were issued on a single year basis, rather than a multi-year cycle, ADF&G permit numbers were used to estimate the number

of active dischargers. Although not all facilities require a Fish Habitat Permit, ADF&G indicated that more than 99% of applicants require a permit (personal communication, Ronald Benkert, Habitat Biologist, ADF&G Palmer, January 27, 2012). Therefore, based on approximately 1,000 single year ADF&G Fish Habitat Permits issued for 2011, and an average of four permits per facility, DEC estimates that approximately 250 dischargers were active in 2011.

Of the 250 active dischargers, approximately 207 were located in freshwater streams, 43 were located in marine waters less than or equal to 20 feet deep, and none were located in marine waters greater than 20 feet deep.

Table 1 summarizes permit-related dates for the *Small Suction Dredge Placer Miners General Permit*.

Table 1: AKG375000 Permit Dates

Agency	Issuance Year	Public Notice		Signed Date	Effective Date	Expiration Date
		Start Date	End Date			
EPA	1994 [a]	01/14/1994	02/14/1994	05/13/1994	06/30/1994	06/30/1999
EPA	1997	01/31/1996	04/18/1996	11/18/1996	04/07/1997	04/09/2002
EPA	2002	12/19/2001	02/04/2002	04/22/2002	06/03/2002	06/04/2007
EPA	2007	01/16/2007	03/02/2007	04/24/2007	06/05/2007	05/31/2012
DEC	2012	05/25/2012	06/24/2012	08/21/2012	09/20/2012	09/19/2017
DEC	2017	Pending	Pending	Pending	Pending	Pending

Notes:

a. *General Permit for Placer Mining in Alaska (AKG370000*)

3.0 INDUSTRY DESCRIPTION

Placer mining involves the mining and extraction of gold or other heavy metals and minerals primarily from alluvial deposits. These deposits may be in existing stream beds or ancient, often buried, stream deposits, i.e., paleo or fossil placers. Many Alaskan placer deposits consist of unconsolidated clay, sand, gravel, cobble and boulders that contain very small amounts of native gold or other precious metals. Most are stream deposits that occur along present stream valleys or on benches or terraces above existing streams. Beach placer deposits have been and continue to be important producers in Alaska. These deposits, most notable near Nome, include both submerged and elevated beach placer deposits.

Placer mining methods to extract gold bearing material (ore) from a deposit include both dredging systems and open cut mining. Dredging systems consist of a supporting hull with a mining control system, excavating and lifting mechanism, gold recovery circuits (e.g., sluice box), and waste disposal discharge. All dredges are designed to work as a unit to dig, classify, beneficiate ores, and dispose of waste. Because dredges work the stream bed or ocean floor, rather than terrestrial areas, the effluent consists entirely of in situ water and bed material.

Dredging systems are further classified as hydraulic (e.g., suction dredges) or mechanical (e.g., bucket dredging), depending on the methods of digging. Suction dredges, the most common

hydraulic dredging systems, are popular in Alaska with the small and medium scale gold placer miners for recreational and commercial purposes. A suction dredge, often handled by a diver, is akin to a vacuum cleaner used underwater and sucks up the bed material. The material passes through a suction hose to a surface-mounted sluice box and is eventually discharged out the bottom of the sluice and returned to the stream bed or ocean floor with heavier material (e.g., gold) remaining in the sluice box.

Highbankers operate in a manner similar to small suction dredges. However, highbankers are constructed with support legs, rather than flotation devices; are hand-fed with a shovel or bucket, rather than a suction hose; and utilize a water pump only to provide water to the beneficiation system. Highbankers typically operate on a stream bank outside the active channel and discharge to land. However, some highbankers operate within the active channel and discharge to waterbodies. Suction dredges and highbankers that work the active stream bed, ocean floor, or inter-tidal zone, rather than terrestrial areas, discharge effluent that consists entirely of in-situ water and bed material.

Suction dredges and highbankers both use sluice boxes to perform the primary processing function of beneficiation. A sluice box is a long, sloped trough into which water is directed to separate gold from ore. A slurry of water and ore flows down the sluice and the gold, due to its relatively high density, is trapped in riffles along the sluice. The material from the sluice box is often further separated by panning the sluice extract.

4.0 RECEIVING WATERBODY

The permit authorizes discharges to waters of the U.S. [as defined in 18 AAC 83.990(77)] statewide with certain limitations (Fact Sheet Section 1.3).

Regulations in 18 AAC 70 require that the conditions in permits ensure compliance with the Alaska Water Quality Standards (WQS). The WQS are composed of use classifications, numeric and/or narrative water quality criteria, and an antidegradation policy. The use classification system designates the beneficial uses that each waterbody is expected to achieve. Protected use classifications include water supply for drinking, culinary, food processing, agriculture, aquaculture, and industrial; water recreation, both contact and secondary; growth and propagation of fish, shellfish, other aquatic life, and wildlife; and harvesting for consumption of raw mollusks or other raw aquatic life. The numeric and/or narrative water quality criteria are the criteria deemed necessary by the State to support the beneficial use classification of each waterbody. The antidegradation policy ensures that the beneficial uses and existing water quality are maintained.

Waterbodies in Alaska are designated for all uses unless the water has been reclassified under 18 AAC 70.230(e). Some waterbodies in Alaska can also have site–specific water quality criterion per 18 AAC 70.235, such as those listed under 18 AAC 70.236(b).

Receiving waters that have been reclassified as industrial use only include Franklin Creek; Isabell Creek (upper); Lillian Creek; Lucille Creek; Nolan Creek and all its tributaries, excluding Acme Creek near Wiseman; Olive Creek (upper); and Ruth Creek near Livengood.

This permit is available for dischargers in reclassified waters. The conditions contained in this permit may be more stringent than those within individual permits in the same locations. A facility located on any of the above waterbodies may apply to DEC for an individual APDES

permit (Permit Part 1.4). The Department will consider individual permit applications on a case-by-case basis and make the final determination as to which permit the applicant should receive.

5.0 EFFLUENT LIMITATIONS

5.1 Basis for Permit Effluent Limits

The CWA requires that the limits for a particular pollutant be the more stringent of either technology-based effluent limits or water quality-based effluent limits. Technology-based effluent limits are set according to the level of treatment that is achievable using available technology. A water quality-based effluent limit is designed to ensure that WQS for a waterbody are met. Water quality-based effluent limits may be more stringent than technology-based effluent limits. The permit limits reflect whichever requirements (i.e., technology-based or water quality-based) are more stringent.

5.2 Technology-Based Limits

EPA promulgated effluent limitation guidelines (ELGs) for the gold placer mining point source category in 1988 [40 CFR § 440.143 Subpart M, as adopted by reference at 18 AAC 83.010(g)(3)]. The ELGs specify the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT); the best available technology economically achievable (BAT); and New Source Performance Standards (NSPS). The ELGs also established Best Management Practices (BMPs). However, the gold placer mining ELGs are not applicable "to dredges which process less than 50,000 cu yd of ore per year, or to dredges located in open waters (i.e., open bays, marine waters, or major rivers)." Because the facilities covered under the permit either process less than 50,000 cu yd of ore per year or are located in open waters, the promulgated ELGs are not applicable and, therefore, the permit does not contain technology-based effluent limits.

5.3 Water Quality-Based Effluent Limits

The CWA required the establishment of limitations in permits necessary to meet WQS by July 1, 1977 [CWA § 301(b)(1)]. DEC regulations require that permits include water quality-based effluent limits that "achieve water quality standards established under CWA § 303, including State narrative criteria for water quality" [18 AAC 83.435(a)(1)]. All discharges to state waters must also comply with state and local coastal management plans, as well as with WQS, including the State's antidegradation policy.

Pursuant to CWA § 402(a)(2) and 18 AAC 83.475(3), BMPs must be included in a permit "when numeric effluent limitations are infeasible." Suction dredging's unique method of intake and displacement presents unusual permitting issues. As discussed above (Fact Sheet Section 3.0), a dredge is a mechanical device that operates on the water surface and elevates bed material and in situ water into a sluice box from which gold or other minerals may be recovered. The discharge from dredges consists entirely of intake water and bed material immediately released back into the receiving water. Unlike larger dredge systems, small suction dredges are recreational in nature and typically operated by a single person, making efforts to conduct simultaneous downstream monitoring during operation impractical. Furthermore, because dredges do not contain treatment systems, nor add pollutants other than those already present in

the intake water or bed material, numerical limitations and the associated monitoring are considered infeasible for most operations; therefore, BMPs have been established in the permit to control the discharges (Permit Part 2.1).

DEC determined that turbidity is a pollutant of concern and must be limited to protect State WQS. The BMPs include requirements to minimize and manage turbidity from the discharge and are applicable to all facilities authorized under the permit. Furthermore, the permit includes BMPs minimizing releases of petroleum hydrocarbons and requires response actions when a release occurs.

6.0 SPECIAL CONDITIONS

6.1 Best Management Practices (BMPs)

BMPs are measures that are intended to prevent or minimize the generation and the potential for the release of pollutants from industrial facilities to the waters of the U.S. through normal operations and ancillary activities. APDES permits must include BMPs to control or abate the discharge of pollutants when 1) numeric effluent limitations are infeasible or 2) the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA [18 AAC 83.475(3) – (4)].

The following sub-sections describe the required BMPs and rational:

6.1.1 Mining in fresh waters is only permitted within the active stream channel. Mining within the active stream channel that results in undercutting, littoral channeling, or that otherwise results in erosion of a stream bank is prohibited. This provision does not apply to facilities operating within disconnected ponds or meander cutoffs if the permittee has received an ADF&G determination that the location is non-fish-bearing.

This practice ensures that erosion does not occur and that the finer sediments and organics occurring within quiescent areas do not cause excessive turbidity problems in the receiving waters.

6.1.2 Motorized winches or other motorized equipment shall not be used in fresh water to move boulders, logs, or other natural obstructions within the active stream channel. This prohibition does not apply to the non-routine use of such equipment either to move obstructions that present an immediate safety hazard or to assist with reclamation upon completion of mining.

This practice 1) ensures that important habitat including large organic debris and boulders will not be destroyed and 2) prevents any erosion, and related turbidity problems from changes in the streamflow. Because many permittees operate in streams with large boulders or other obstructions, the obstructions must be moved to prevent possible entrapment or pinning of the diver. The BMP includes an allowance for the use of motorized equipment in situations where safety is a concern. The allowance provides for the efficient and safe removal of obstructions in non-routine situations.

6.1.3 Boulders, logs, or other natural obstructions must be kept as close to their original location within the active stream channel as possible. Material that is moved by the operator must not be placed in a manner that significantly alters the active stream channel or otherwise redirects the flow of water into the streambank causing erosion or undercutting.

This practice, similar to those described in Sections 6.1.1 and 6.1.2 above, ensures that stream habitat is kept as close to the original condition as possible and that relocated or dredged material will not contribute to undue erosion and related turbidity problems from changes in the streamflow.

6.1.4 Operators shall use reasonable care to avoid mining through silt and clay materials that would result in significant increases in turbidity. Reasonable care includes moving the mining equipment to a new location or reducing the discharge rate by limiting the operation speed.

This practice decreases the amount of fine material that will be released into the receiving water and minimizes the length of the turbidity plume.

6.1.5 Mercury from historical mine operations or other pollutants may be encountered during mining operations. The permittee must take measures to ensure mercury or other pollutants, such as lead, that are removed from the wastewater streams are retained in storage areas and not released to the waters of the U.S. Information on how to safely handle, store, and dispose of mercury or other pollutants can be obtained by contacting DEC at the address in Appendix A, Part 1.1.1.

Due to historical mining operations, hunting, fishing, and other factors, dredge operations may occasionally encounter mercury, lead (e.g., buckshot or fishing weights), or similar pollutants. The intent of this practice is to ensure that any collected pollutants are properly disposed of and not returned to the waterbody.

6.1.6 Mining equipment must not house invasive species. Equipment must be self-inspected and cleaned prior to its placement in waters of the U.S. and when transferring from one waterbody to another.

Invasive species, such as Elodea, that pose threats to aquatic resources have begun to establish themselves in Alaskan waters. The intent of this practice is to ensure that invasive plants or animals are not transferred to waters of the U.S. from dredges, particularly those dredges that are new to the state.

6.1.7 Petroleum products must be properly managed during storage, refueling, and operation to prevent spillage into surface waters or groundwater. Equipment must be free of excess oils and grease and must not release petroleum products. Discharge may not result in floating oils on the surface of the waterbody or cause a film or sheen from petroleum hydrocarbons, or oils and grease, on the surface or floor of the waterbody or adjoining shorelines.

These practices ensure that petroleum contamination from fuel storage, refueling, and operation is prevented or otherwise mitigated.

6.1.8 If floating oil or a film or sheen from petroleum products is observed, operation must cease until the source of the problem can be identified and corrective action can be taken. Any spills must be cleaned up using materials, such as sorbent pads and booms. All spills containing fuel, oil, or other hazardous substances must be reported upon discovery to the DEC spill response team at 1-907-451-2121 within normal business hours or 1-800-478-9300 outside normal business hours.

These practices ensure that contamination from petroleum releases is minimized to the greatest extent practicable. The reporting requirement aligns with DEC regulations stating "a person must notify the [DEC] by telephone immediately in the result of a release or discharge of a hazardous substance" (18 AAC 75.300).

6.2 Seasonal Restrictions

The permit requires operators to adhere to any seasonal restrictions contained within ADF&G Fish Habitat Permits, DNR land-use approvals and permits for marine waters, and DEC coverage approvals provided for federal reserves and protected habitats (Permit Part 2.2). The seasonal restrictions supplement protections for spawning fish, red king crab, and other aquatic resources. Rather than include site-specific seasonal restrictions within authorizations under the general permit, DEC relies on the expertise of complementary State and federal agencies. Permittees must maintain copies of the Fish Habitat Permits and DNR land-use permits on site.

6.3 Separation Requirements

Permit Part 2.3.1 outlines separation requirements applicable to turbidity plumes. The separation requirements ensure a *zone of passage* for fish migration and minimize cumulative impacts from multiple facilities operating simultaneously in close proximity to each other. "Zone of passage" is defined within Permit Appendix C.

Permit Part 2.3.2 implements a 500 feet separation between discharges and locations where anadromous fish are spawning or where anadromous fish eggs, anadromous fish alevins, or resident fish spawning redds are known to exist at the time dredging occurs. This prohibition, along with seasonal restrictions based on ADF&G Fish Habitat Permits (Fact Sheet Section 6.2), ensures that spawning anadromous fish are not disturbed and that anadromous fish eggs, anadromous fish alevins, and resident fish spawning redds are not buried or otherwise harmed. Permit Appendix C defines "anadromous fish," "resident fish," and "spawning" based on regulations at 18 AAC 70.255(h)(2) and 18 AAC 70.990.

Permit Part 2.3.3 prohibits discharges where the turbidity plumes may negatively impact the intakes of active public water systems (PWSs). Dredge operations are unlikely to interfere with groundwater intakes; therefore, the separation is only applicable to systems that are under the direct influence of surface water. Permittees who wish to obtain further information, such as locations of known intakes, are advised to visit the interactive web map (http://dec.alaska.gov/das/gis/apps.htm) or contact the DEC Drinking Water Protection group.

Critical habitat for northern sea otter occurs near Kodiak Island and along the Aleutian Chain. Permit Part 2.3.4 requires operations in critical habitat for northern sea otter (see Permit Appendix D, ESA Habitat Areas) to maintain a distance of 800 feet from any northern sea otter during operation. To account for otter movements, the distance provides a 300 feet buffer between the otter and an estimated maximum plume length of 500 feet.

Essential Fish Habitat for red king crab occurs in Norton Sound offshore of Nome. To ensure red king crabs are not disturbed, Permit Part 2.3.5 requires that operations avoid red king crab mating pairs and clusters and either move to an alternate location or cease operation if crabs are observed.

To protect sensitive marine habitats that may be negatively impacted by turbidity plumes, Permit Part 2.3.6 prohibits discharges within coral beds, eelgrass beds, seagrass beds, kelp beds, vegetated shallows, and shellfish beds.

7.0 STANDARD CONDITIONS

Appendix A of the permit contains standard regulatory language that must be included in all APDES permits. These requirements are based on the regulations and cannot be challenged in the context of an individual APDES permit action. The standard regulatory language covers requirements such as monitoring, recording, reporting requirements, compliance responsibilities, and other general requirements.

8.0 ANTIDEGRADATION

The antidegradation policy of the Alaska WQS requires that the existing water uses and the level of water quality necessary to protect existing uses must be maintained and protected (18 AAC 70.015). The following analysis provides rationale for the Department's decisions with respect to the antidegradation policy.

The Department's approach to implementing the antidegradation policy is based on the requirements in 18 AAC 70 and the Interim Antidegradation Implementation Methods (DEC 2010). Using these requirements and policies, the Department determines whether a waterbody or portion of a waterbody is classified as Tier 1, Tier 2, or Tier 3. A higher tier indicates a greater level of water quality protection. This antidegradation analysis conservatively requires that all operations under the general permit will be in Tier 2 waters and focuses on that level of protection. The permit specifically excludes coverage in Tier 3 waters (Permit Part 1.3).

At this time, the Department has not designated any Tier 3 waters in Alaska. However, if an applicant applies for authorization under the permit to discharge to certain sensitive habitats (Permit Part 1.3), the Department may decline general permit coverage and require an application for an individual permit. An operation proposed for a National Park System Unit, National Wildlife Refuge, water designated as wild under the Wild and Scenic Rivers Act, or similar protected area requires additional review from the agency with management authority over the area and may be subject to additional seasonal or geographic restrictions on the authorization (Permit Part 1.5).

Authorizations under this permit include BMPs for all permittees. An antidegradation analysis was applied on a parameter-by-parameter basis, and the Department concluded that the implementation of BMPs to manage turbidity should be subjected to an antidegradation analysis.

The State of Alaska's antidegradation policy states that existing water uses and the level of water quality necessary to protect existing uses must be maintained and protected; and if the quality of water exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality must be maintained and protected. The Department

will authorize a reduction in water quality only after the applicant submits evidence in support of the application and the Department finds that the five specific requirements of the antidegradation policy at 18 AAC 70.015(a)(2)(A)-(E) are satisfied. The Department's findings follow.

8.1.1 **18 AAC 70.015 (a)(2)(A). Allowing lower water quality is necessary to accommodate important economic or social development in the area where the water is located.**

Rationale: The localized lowering of water quality is necessary given the operational practices of small suction dredging and highbanking (Fact Sheet Sections 3.0 and 5.0) and economical concerns associated with additional water treatment. An attempt to modify current practices in effort to mitigate the lowering of water quality would likely result in making this largely recreational endeavor financially and technically impractical for the vast majority of participants, or potentially result in equal or greater degradation to the lands adjacent to these streams (Fact Sheet Section 8.1.4).

Placer mining has occurred in Alaska since the late 1800s and has contributed to the economic and social development of the state. A 2014 survey of placer mine operators, open-cut and suction dredge, conducted by McDowell Group (McDowell 2014) indicates that placer mining continues to have a significant economic impact in Alaska. Although the survey did not distinguish between open-cut and suction dredge operations, the McDowell report found that overall in 2013:

- placer mining-related employment statewide (indirect and induced) totaled 1,700 jobs with a total statewide labor income of $65 million;
- placer mine production totaled approximately 82,000 ounces of gold, with a total gross production value of approximately $105 million; and
- placer miners spent approximately $65 million on goods and services for their operations, with 88% (or $57.1 million) spent in Alaska.

The placer mining sector also creates revenue for the State of Alaska through a number of mechanisms, including royalty payments, taxes (for example, mining license tax, corporate net income tax, and state fuels tax), annual claim rental, annual labor, and mining permit fees. Payments are also made to various state and local government departments for programs, fees, services, and local sales tax (where levied).

Many placer mines continue to act as small family business. Survey results from the 2014 McDowell report indicate that in 2013, 27% of placer operations were only worked by a single permit holder with no additional employees; 30% of placer operations had two workers, and approximately 44% of placer operations had three or more workers. On average, 4.1 workers worked on active placer operations. Nearly half (47%) of the active placer operators with employees had at least one family member working on their claim. On average, these family-oriented operations have 1.7 family members employed.

A large percentage of the facilities covered under the permit occur in the Nome area. Placer gold mining has occurred near Nome for over 100 years and has played an integral role in the economy and community development. From 1898 to 1993, an estimated 4,822,569 ounces gold were produced from stream, hillslope or colluvial, glacial, and marine strandline placer deposits throughout the area, making the Nome district Alaska's

second largest producer of placer gold (Bundtzen et al. 1994). Reports estimate 3.3 million to 10 million ounces of gold remain offshore of Nome (Lasley 2011).

DNR held a competitive sale for offshore mineral leases in Norton Sound on September 28, 2011. The lease sale conveyed a total acreage of 23,793 acres and brought in $7.6 million in sales (personal communication, Bill Cole, Geologist, DNR, November 23, 2012). Mineral leases were purchased by a range of bidders, from local residents to global mining companies. The lease sale, increased gold prices from 2011 to 2012, and media coverage from television shows, such as Bering Sea Gold, has spurred a modern-day gold rush in the area.

As described in the DNR Final Finding and Decision for the lease sale (DNR 2011), a vibrant offshore mining industry provides jobs for Alaskans, particularly in the Nome area. A number of offshore dredgers presently live in Nome. Some currently have leases or operate on leases held by other miners. Others operate within the two public mining areas offshore of Nome or on nearby submerged claims. In addition to State revenue, mining operations also purchase significant amounts of equipment, parts, fuel, food, freight, and other services; bring business to local merchants and suppliers; and expand and diversify the local economic base.

After the 2010 opening of the West Nome Beach Public Mining Area in Nome and the 2011 offshore lease sale, the increase in mining activity brought significant economic growth to Nome. The influx of commercial and recreational mining activity has increased city tax revenue and added a new sector to Nome's seasonal tax base. A 2015 study conducted by the Department of Commerce, Community, and Economic Development (DCCED) indicates the City of Nome has seen a significant increase in tax revenue, along with increased revenue from the collection of docking permits and harbor storage fees, since the influx of miners began in 2011 (DCCED 2015). During the 2010 to 2014 timeframe, the city population remained relatively unchanged, increasing by 1.6 percent. Outside of the construction of the Norton Sound Regional Hospital, which was completed in 2012, no other large economic drivers entered the region. From 2010 to 2013, sales tax revenue increased by 21 percent, rising from $4,443,756 to $5,373,835. Total property taxes (excluding oil and gas property taxes) increased by 68 percent, rising from $1,577,427 to $2,653,922. The local bed tax increased by 25 percent, growing from $126,575 to $157,913 (DCCED 2015).

Increased offshore operations also provided revenue to the State of Alaska total from rental payments and production royalties. In 2013, total rent paid to the State on offshore mining leases and submerged land mining claims within the Norton Sound area was approximately $50,000 and total production royalties were approximately $8,000 (DCCED 2015). Although resource depletion in Nome may eventually lessen recreational interest in the offshore public mining areas, the economically viable placer gold found in large offshore lease tracts is expected to sustain a long-term commercial mining industry (DCCED 2015).

The Department finds that operation and authorization of suction dredge discharges under the permit accommodates important economic and social development and that this requirement is met.

8.1.2 **18 AAC 70.015 (a)(2)(B). The reduced water quality will not violate applicable water quality criteria, except as allowed under 18 AAC 70.015(a)(2).**

Rationale: Due to the nature of small scale suction dredging and highbanking, treatment options are limited and numeric effluent limitations are infeasible. Regulations at 18 AAC 83.475(3)–(4) require APDES permits to include BMPs to control or abate the discharge of pollutants when 1) numeric effluent limitations are infeasible or 2) the practices are reasonably necessary to carry out the purposes and intent of the CWA. Thus, the permit implements BMPs, as well as seasonal restrictions and separation requirements, ensuring maximum protection of water quality downstream of the operations and carrying out the purpose and intent of the CWA.

Moreover, suction dredging is a mobile operation, and impacts are localized and transient. See the June 1999 final report prepared for EPA titled *Impact of Suction Dredging on Water Quality, Benthic Habitat, and Biota in the Fortymile River, Resurrection Creek, and Chatanika River, Alaska* (Prussian et al. 1999), and *Studies of Suction Dredge Gold-Placer Mining Operation Along the Fortymile River, Eastern Alaska* (USGS 1997). Special Conditions in Permit Part 2.0 will provide the maximum protection of water quality under 18 AAC 70.240(b).

The Department finds that this requirement is met.

8.1.3 **18 AAC 70.015(a)(2)(C). Resulting water quality will fully protect existing uses.**

Rationale: Previous versions of this permit, and other individual permits that authorize similar discharges, have authorized discharges from suction dredges since 1994. When compared to requirements in previous general and individual permits, this permit does not propose any changes that would contribute to the discharge of lower quality wastewater.

The Department finds that the resulting water quality will be adequate to fully protect existing and designated uses and that this requirement is met.

8.1.4 **18 AAC 70.015(a)(2)(D). The most effective and reasonable methods of pollution prevention, control, and treatment will be applied to all wastes and other substances to be discharged.**

Rationale: The Department finds the most effective methods of prevention, control, and treatment are the practices and requirements set out in this permit and currently in use at these facilities. The nature of suction dredge operations allows for limited treatment options (Fact Sheet Sections 3.0 and 5.0); therefore, permittees must implement BMPs and adhere to seasonal restrictions, and separation distance requirements to prevent and control pollution (Fact Sheet Section 6.0). Alternative methods for pollution prevention control and treatment, such as adjacent land discharges, would come with associated pollution problems as stated above. In addition, land discharges removed from the riparian zone would most likely result in making this largely recreational endeavor technically and financially impractical for the vast majority of participants. Accordingly, mine operators are required to implement conditions that DEC has concluded are the most effective and reasonable methods of pollution prevention, control, and treatment (Permit Part 2.0).

The Department finds that this requirement to address pollution prevention, control, and treatment is met.

8.1.5 **18 AAC 70.015(a)(2)(E). Wastes and other substances discharged will be treated and controlled to achieve the highest statutory and regulatory requirements.**

Rationale: Applicable "highest statutory and regulatory requirements" are defined in DEC regulations at 18 AAC 70.990(30) (June 26, 2003). Accordingly, there are three parts to the definition. The first part of the definition includes all federal technology-based ELGs, as found in 40 CFR Part 440 Subpart M, as adopted by reference at 18 AAC 83.010(g)(3). Pursuant to Subpart M(b), the provisions of Subpart M are not applicable to applicants under the *Small Suction Dredge Placer Miners General Permit*. Therefore, as described in Fact Sheet Section 5.2, the permit does not contain technology-based limits. The second part of the definition, 18 AAC 70.990(30)(B), appears to be in error, as 18 AAC 72.040 describes discharges to sewers and not minimum treatment. The correct reference appears to be the minimum treatment standards found in 18 AAC 72.050, which refers to domestic wastewater discharges only. However, because the permit does not authorize discharge of domestic wastewater, further analysis under this regulation is not necessary. The third part includes any more stringent treatment required by state law, including 18 AAC 70 and 18 AAC 72. The correct operation of equipment, BMP implementation, and adherence to other permit requirements will control the discharge and satisfy all applicable federal and State permit conditions and requirements. This achieves the highest statutory and regulatory requirements.

The Department finds that the treatment required in the permit achieves the highest statutory and regulatory requirements and that this requirement is met.

9.0 OCEAN DISCHARGE CRITERIA EVALUATION

Section 403(c) of the CWA requires that permits for ocean discharges be issued in compliance with EPA's Ocean Discharge Criteria for preventing unreasonable degradation of ocean waters. The purpose of the Ocean Discharge Criteria Evaluation (ODCE) report is to identify pertinent information and concerns relative to the Ocean Discharge Criteria and wastewater discharges.

EPA's Ocean Discharge Criteria set forth specific determinations of "unreasonable degradation of the marine environment" that must be made prior to permit issuance [40 CFR Part 125, Subpart M, as adopted by reference at 18 AAC 83.010(c)(8)]. For this permitting action, DEC is relying on 40 CFR 125.122(b) which states "Discharges in compliance with section 301(g), 301(h), or 316(a) variance requirements or State water quality standards shall be presumed not to cause unreasonable degradation of the marine environment, for any specific pollutants or conditions specified in the variance or the standard." Because the permit implements BMPs, as well as seasonal and geographic restrictions, that ensure applicable water quality standards are being met, pursuant to 40 CFR 125.122(b), DEC determined discharges authorized under the permit not to cause unreasonable degradation of the marine environment.

10.0 REFERENCES

ADF&G (Alaska Department of Fish and Game). 1998. Catalog of waters important for spawning, rearing, or migration of anadromous fishes. ADF&G, Habitat Division, 6 vols., Anchorage, Alaska. Revised periodically.

Bundtzen, T. K., R. D. Reger, G. M. Laird, D. S. Pinney, K. H. Clautice, S. A. Liss, and G. R. Cruse. 1994. Progress report on the geology and mineral resources of the Nome mining district. State of Alaska Department of Natural Resources, Division of Geological and Geophysical Surveys, Public-Data File 94-39, Fairbanks, Alaska.

DCCED (Alaska Department of Commerce, Community, and Economic Development). 2015. Nome suction dredge study. State of Alaska, DCCED, Division of Economic Development.

DEC (Alaska Department of Environmental Conservation). 2008. National Pollutant Discharge Elimination System memorandum of agreement between State of Alaska and United States Environmental Protection Agency Region 10, as amended through August 11, 2011. State of Alaska, Department of Environmental Conservation.

DEC. 2010. Interim antidegradation implementation methods, Effective July 14, 2010. State of Alaska, Department of Environmental Conservation, Policy and procedure No. 05.03.103.

DNR (Alaska Department of Natural Resources). 2011. Final finding and decision: Nome offshore lease sale for locatable minerals ADL 231169. Alaska Department of Natural Resources.

EPA (Environmental Protection Agency). 1998. Alaska placer mining metals study. US Environmental Protection Agency, Office of Environmental Assessment, Region 10, EPA-910-R-98-003, Seattle, Washington.

EPA. 1999a. Alaska placer mining metals study - year two. Environmental Protection Agency, Office of Environmental Assessment, Region 10, EPA910-R-99-004, Seattle, Washington.

Lasley, S. 2011. Sunken gold draws global miners to Nome. North of 60 Mining [In] Petroleum News 16 (44):3-4. http://www.petroleumnews.com/pntruncate/948275969.shtml Accessed August 2015.

McDowell (McDowell Group, Inc.) 2014. The economic impacts of placer mining in Alaska. Prepared by McDowell Group Inc. for the Alaska Miners Association, Inc., Anchorage, Alaska.

NMFS (National Marine Fisheries Service). 2005. Final environmental impact statement for essential fish habitat identification and conservation in Alaska, Appendix D: D77-D81. US Department of Commerce, National Oceanic and Atmospheric Administration, NMFS, Alaska Region, Juneau.

Prussian, A.M., T.V. Royer, and G.W. Minshall. 1999. Impact of suction dredging on water quality, benthic habitat, and biota in the Fortymile River, Resurrection Creek, and Chatanika River, Alaska. Prepared by Idaho State University for the Environmental Protection Agency, Region 10, Seattle, Washington.

USGS (United States Geological Survey). 1997. Studies of suction dredge gold-placer mining operation along the Fortymile River, Eastern Alaska. Department of Interior, USGS, Fact Sheet 154-97.